RADIUM PRODUCTION

DURING the period of the war, with no carnotite exports, the greatest part of the world's radium supply has been produced in the United States. The following table shows the radium output of the Standard Chemical Company of Pittsburgh, Pa., since 1913, at which time radium was first produced in the United States.

	Radium Element, Grams
1913	2.1
1914	9.6
1915	1.7
1916	5.0
1917	7.0
1918	13.6
	39.0

It is estimated that the total radium production in the United States to 1919 approximates 55 grams of radium element, and this represents, probably, more than half of all the radium produced in the world.

There has been some discussion lately by members of the Bureau of Mines as to the amount of radium that can be produced from the carnotite fields, as well as suggestions that mesothorium, a by-product from monazite, should replace radium in the luminous material which has found extensive use in the war on airplane and ship instrument dials, compasses, and many indicating devices, and which will find extensive use on watches and clocks, etc.

The estimates of Dr. Moore, of the Bureau of Mines, are based on a very inadequate study of the carnotite region made prior to the war and before the fields had been developed to any great extent. The carnotite holdings of the Standard Chemical Company, which are the largest under the control of a single company or individual and comprising about 350 claims, have been carefully studied—in part by systematic diamond drilling—and this work has been the basis for an estimate that at the least 500 grams of radium should be produced from carnotite. This is five times greater than Dr. Moore's estimate.

As regards mesothorium as a radium substitute, there are several points whose importance Dr. Moore and the Bureau of Mines have overlooked or minimized, in their anxiety to conserve radium. Statistics show that before the war considerably less than one thousand tons of monazite was worked up in the United States per annum in the production of thorium nitrate, and it is estimated that about three thousand tons of monazite supply the world's needs for thorium nitrate. Each ton of monazite containing about 5 per cent. of thoria (corresponding to good Brazilian concentrates) will yield about two milligrams of commercial mesothorium, so that per annum there may be expected a world's mesothorium production of about six grams. The cost of producing monazite will always prevent the production of mesothorium except as a by-product. Unlike radium, which has a half-decay period of 1,700 years and can be used in luminous material immediately after refining and for medical purposes after thirty days' aging, mesothorium has a comparatively brief half-decay period of 5.5 years and its economical use in luminous compound is only possible a year or two after refining. For medical purposes, the short life and varying gamma ray activity of mesothorium make this product less desirable than radium. The following table given by McCoy and Cartledge[1] shows the change in gamma-ray activity of pure mesothorium in time, due to the gradual decay of mesothorium I. (the parent product) and the increase and decrease of radiothorium, which produces thorium D with its very penetrating gamma rays.

THE CHANGE OF GAMMA RAY ACTIVITY OF MESOTHORIUM WITH TIME

Time in Years	Ms I	Th D	Total
0	1.000	0.000	1.000
1	0.881	0.489	1.370
2	0.777	0.781	1.558
3	0.685	0.935	1.620
4	0.604	1.000	1.604
5	0.532	1.007	1.538
6	0.469	0.973	1.442
7	0.413	0.921	1.334
8	0.364	0.855	1.219
9	0.321	0.786	1.107
10	0.283	0.715	1.998

[1] *Jour. Am. Chem. Soc.,* XLI., 53, January, 1919.

The figures given under Th D are based upon the amount of radiothorium which accumulates in mesothorium, and it is this product which also measures the alpha-ray activity of mesothorium. It is evident from the figures given under Th D that the alpha-ray activity of pure mesothorium reaches a maximum between the fourth and fifth year after its preparation and, further, that it is less than 50 per cent. "aged" one year after preparation. In spite of the fact that commercial mesothorium owes a proportion—probably 20 per cent.—of its activity to the presence of radium, it follows that it would be uneconomical to use mesothorium in luminous compound until it had aged for a year or two. It seems evident that the small supply available, the varying activity and the necessity for prolonged aging of mesothorium are some of the reasons that make this material less desirable than radium, both for medical purposes and in luminous compound, especially with an assured supply of radium wholly adequate for both requirements.

Charles H. Viol

Pittsburgh, Pa.

STATISTICAL STUDY OF THE INFLUENZA EPIDEMIC

The American Public Health Association, Vital Statistics Section, appointed a Committee on Statistical Study of the Influenza Epidemic on November 20, 1918. Under the auspices of this committee, a meeting of the state and municipal registrars in the eastern states was held at the University of Pennsylvania, Hygiene Laboratory, Philadelphia, Pa., on November 29 and 30, 1918. There were present, also, at this initial conference, several private statisticians interested in the public health statistics of the epidemic and the results to be derived from study of such data. A series of suggestions was made up, mimeographed and sent to statistical and public health workers for criticism. At the meeting of the Vital Statistics Section in Chicago on December 11, the committee submitted a report on its activities and asked for authority to continue further inquiry into a program of statistical study of the epidemic. The section authorized the continuance of the committee and provided that representatives of the United States Bureau of the Census, of the United States Army and Navy, of the United States Public Health Service, of the state and municipal health boards, and the various statistical, sociological, actuarial and economic associations be represented thereon. The committee was specifically authorized to act in an advisory capacity first, to outline the various sources of data, the minimum standards of tabular and registration practises to be observed by the several organizations providing data, and second, to bring in recommendations on the pathometric or mathematical analysis of published epidemic data. The committee was divided into four subcommittees as follows:

Subcommittee A: *Registration and Tabulation Practise of the Federal Departments.* (Wm. H. Davis, M.D., chief statistician, Division of Vital Statistics, Bureau of the Census, *Chairman;* Richard C. Lappin, *Recorder.*)

Subcommittee B: *Registration and Tabulation Practise of the State Departments and Commissions.* (Otto R. Eichel, M.D., director, Division of Vital Statistics, New York State Department of Health, Albany, *Chairman;* Edwin W. Kopf, *Recorder.*)

Subcommittee C: *Registration and Tabulation Practise of Municipal Boards of Health and of Private Public Health Agencies.* Chas. Scott Miller, M.D., Philadelphia Department of Health, Philadelphia, Pa., *Chairman.*)

Subcommittee D: *Pathometry* (mathematical analysis and interpretation) *of the Epidemic.* (Charles C. Grove, Ph.D., Columbia University, *Chairman;* Arne Fisher, F.S.S., *Recorder.*)

Mr. E. W. Kopf was delegated to act as chairman of the General Committee and to coordinate the work of the several subcommittees. The General Committee of the Vital Statistics Section was authorized to cooperate in statistical matters with the Influenza Reference Committee of the entire association.[1]

[1] See "Influenza Bulletin." *American Public Health Association,* Boston, December 13, 1918.